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ABSTRACT

Teacher training is high on the priorities of the European Commission. One action has been to fund three Telematics projects that focus on telematics and teacher training within the Telematics Application Program. This paper is part of the work of the T3 (Telematics for Teacher Training) project which is coordinated from the University of Exeter. The T3 project focuses on the establishment of communities of teachers in four discipline areas: (1) mathematics, (2) science, (3) languages, and (4) technology. T3 uses two complimentary channels of telecommunications: Internet applications including World Wide Web, e-mail and computer conferencing, and ISDN applications, particularly point-to-point enhanced video conferencing. Describes resources for science teacher (Euroturtle environmental Web site, preservice for biology student teachers, and teaching environmental education) and courses for teacher educators (collaborative professional development, online service to teachers in schools, and modular course for advanced students). Successes and problems and future developments of the T3 project are discussed. (Contains 21 references.) (AEF)

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Developing Telecommunications Within European Teacher Education: Progress, Plans, and Policy

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Developing Telecommunications within European Teacher Education: Progress, Plans and Policy

Niki Davis
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The Commission of the European Union clearly recognises strategic benefits of extending 'advanced distance learning techniques into schools and colleges' within the Bangerman report. Information and communication technologies (Telematics), one of the 10 key application areas, was noted to provide more efficient, more available education and training better able to meet needs (Bates, 1995). Indeed the central tenet of the European policy toward the information society is that European citizens will have the opportunity to become skilled and highly educated irrespective of location. In Europe, each individual's education is established during compulsory schooling under the guidance of the teacher. Teacher training is therefore high on the priorities of the European Commission. One action has been to fund three Telematics projects that focus on telematics and teacher training within the Telematics Application Programme. This paper is part of the work of the T3 (Telematics for Teacher Training) project which is coordinated from Exeter by the author.

The European Commission used the term Telematics because the term Informatics had been used instead of Information Technology in some European countries. The addition of telecommunications resulted in a change of the term to *Tele*matics. Today it is just as acceptable to use the phrase Information and Communication Technologies (ICT), but as this paper describes much work carried out within the Telematics for Teacher Training project, the term Telematics will be used throughout.

Teacher educators are one body of people who can significantly change education in Europe because their effect is multiplied twice: they educate teachers who educate students who are the future citizens of Europe. Training of teacher trainers escalates this to a cubing of the action (*Training* [3]). Teacher educators who model good practice with telecommunications and information technology with their students and for their own professional development will permit their students to take it on board for themselves. This is the principle behind the T3 project. In each country, we have a partner teacher training institution that contributes to establishment and sharing of good practice, and together, we hope to encourage the growth of communities of practice. T3 partners include eight teacher training organisations located across the European Union: Utrecht University (The Netherlands), Dublin City University (Ireland), IUFM Grenoble (France), The University of Gent (Belgium), Instituto Technologie Didattiche Genoa (Italy), the University of Minho (Portugal) and the University of Oulu (Finland). The coordinating partner is the University of Exeter (United Kingdom).

The T3 Project focuses on the establishment of communities of teachers in four discipline areas:

1. mathematics
2. science
3. languages
4. technology

It is embedding telematics within courses for teachers, both preservice training for student teachers and continuing professional development for practising teachers. There are also strands specifically for teacher educators and library staff working with teachers. Best practice is being established in a distributed and growing network of higher education institutions and partner schools that will welcome opportunities to assist in the growth of community through discussion and demonstration.

The development of practice within each discipline is led by a university in a different European country: the UK, Italy, The Netherlands, and Finland respectively. The French partner teacher education institution also enhances the translations of language and tests the transferability of the courses. We are developing approaches to teacher education which model best practice with telematics, in order to provide an ongoing context for the use of telematics in education.

The T3 project consortium decided that, as the Telematics applications need to be accessible to teacher educators, to disregard satellite and broad-band techniques, except for dissemination purposes. However, it should be noted that the use of satellite telecommunications for

courses has been demonstrated and other Telematics Application Programme projects are working on its feasibility for a variety of purposes. T3 uses two complimentary channels of telecommunications:

1. Internet applications including WWW, E-mail and computer conferencing, and
2. ISDN applications, particularly, point-to-point enhanced video conferencing.

Previous Research

The use of communications and information technology in education is not new and T3 draws upon work developed over the last fifteen years around the world. Veen, Collis, de Vries, and Vogelgang (1994) review a range of communication and information technology projects within and across European countries. The majority describe the collaborative use of electronic mail between schools nationally and internationally. A few provide case studies in teacher education, including some of our early work in Exeter. Osorio (1995) describes a needs analysis performed during an international conference in Europe before the arrival of multimedia telematics. Veen, et al. (1994) attempt to draw out the lessons from these projects to provide a basis for teachers new to the use of electronic communications in education and to policy makers.

There have been significant projects in the Far East and Australasia. Similarly there have been major projects in states such as Florida and Virginia. Ruopp, Gal, Drayton, and Pfister (1993) describe a long term project called LabNet which attempts to develop a community of practice among teachers for supporting each other's professional development across the USA. Companies such as AT&T have become involved in the development of services under the guidance of experts such as Margaret Riel. Attempts have also been made to quantify the benefits of such electronic information and communication services. For example, Riel (1994) provides evidence related to development of the skills that employers wish to see in their new recruits and Davis (1994) provides a cost benefit analysis for ISDN in teacher education.

Others within the T3 consortium have worked in this area for some considerable time developing Telematics networks for education and researching the needs and pedagogy for Telematics in education. Notable are the University of Oulu which uses video conferencing for remote teaching in Finland, ITD which provides curriculum development and inservice training through a number of projects in Italy, Project MINERVA which developed Telematics in Portugal, and the NITEC network which supports teachers in schools across Ireland (described by McKenna in Veen et al, 1994).

The Association for Teacher Education in Europe has also been active in this area. Bob Moon led a research seminar for ATEE's Working Group 6 'New Technologies and teacher education' on this topic in Brugges in July 1996 complimented with a draft paper and literature review (Moon, 1996). The European Commission's Multimedia Report (1996) provides a view of the actions for multimedia and telecommunications in education and training across Europe and has been used to inform more recent policy.

The high hopes for the deployment of Telematics to enhance harmonisation across European culture and to improve European education and training provide the context for this paper and the T3 project's work. It is also useful to note that the need for improved forms of teacher training and a major 'updating' of the teaching force are widely recognised by policy makers and those in industry and commerce. The next section describes what we have been able to develop before considering some successes and stresses.

The Development of Telecommunications within European Teacher Education

Our Telematics for Teacher Training project is in the final of its three years in 1998. By September 1997, we had already put telematics into the courses of over 2,000 student or practising teachers. Two examples of courses illustrate the wide variation in approaches and content.

Courses and Resources for Science Teachers

The development for science has been spread across several partners. The early lead was given to Dublin City University (DCU) where Michael Cotter complemented his co-ordination of Ireland's collaboration in the GLOBE project with T3. The GLOBE project, which is centered in the USA, focuses on measurement of climate by each participating school around the world, with a Web Site disseminating information from both schools and satellites in many forms, including weather maps (http://globe.fsl.noaa.gov/). DCU's approach was to provide a two day course for practising teachers to get them started in using the Internet links to GLOBE and in skills for making scientific measurements. Michael's report (Cotter, Davis, & McShea, 1995) showed that this first approach was not replicable across Europe for several reasons, not least that the focus on detailed daily scientific measurements was difficult to fit into the school timetable and access to the Internet was problematic.

The T3 consortium learned from this experience to take a wider variety of strategies which teacher educators could adapt to their purposes and from which to select resources. It therefore moved on to take three parallel approaches:

1. development and support of an environmental Web site
2. teaching and learning with Biology student teachers
3. structured course for delivery to groups of students teachers

1. **Euroturtle**. This is an internationally valuable Web Site that has been developed to act as a model of good practice and to support environmental education by Roger Poland, a teacher and research student in England. The European turtle is an animal under major threat on Greek beaches in the Mediterranean, even greater threat than the related populations which nest on beaches in Florida. The Web Site provides detailed scientific information about turtles and their habits and information about environmental risks. There are materials and teaching activities for both primary and secondary students, including a multimedia simulation about the laying and hatching of turtle eggs and an identification kit. Students' work is displayed and the Web Site continues to be evaluated and to grow in a suitably organic fashion.
2. **Exeter's Preservice Course with Biology Student Teachers**. Linda Baggott has placed many of the materials that she uses in her course for postgraduate students online. The Exeter model of teaching is on the project's T3Centrum Web Site, along with model lesson plans, student work and discussion forums are in preparation. Linda uses these materials to extend her teaching and reduce the face-to-face taught elements. As Exeter students only study in the university for the first of their three terms, this online material and mode of communication is expected to be valuable. Linda also uses video conferencing (the other telecommunications channel used by T3) for supervision 'visits' with her students when they are on teaching practice in certain schools with this telecommunications facility and for liaison with teacher mentors in that school.
3. **Environmental Education Course** T3's Italian partners are constructing a course which will enable student teachers in multi-disciplinary groups to develop appropriate strategies for teaching environmental education. It is derived from an approach used for groups of teachers across Italy in the Media project (Briano, Midoro, & Trentin, 1977). The course will be led by Vittorio Meddera from Genoa, mainly using the Internet to provide the course materials, discussion groups and collaborative work. Starting in early 1998, the pilot will be delivered to groups of student teachers and their local supervising tutors in three countries. Thus the student will not only learn how to deploy telematics within the teaching of environmental education, but they will have the process modeled for them.

Courses for Teacher Educators

The T3 project has included many approaches to training the trainers. This eclectic style is one that the Telematics Centre first noted when researching professional and organisational development of the use of Information Technology within initial teacher training in 1992, during project INTENT (Davis, Kirkman, Tearle, Taylor, & Wright, 1996). Three of these approaches, some of which are not courses themselves but will influence the design and delivery of courses, include:

1. collaborative professional development
2. online services to teachers in schools
3. a modular course for advanced students

1. **Collaborative Professional Development**. The T3 project participants are, in the main, teacher educators who are undertaking significant action research and developing themselves professionally as they develop courses for others. This is a collaborative learning process as well as a collaborative working process. An early form of our professional development was sharing of our approaches to the deployment of Telematics using a 'needs analysis' structured interview over video conference. Six scenarios were illustrated within the interview process (Davis, McShea, H., McShea J., Osorio, Still, & Wright, 1997). Significant learning also occurs during meetings, writing reports and commenting on other peoples' work. Most significant are probably the online discussion groups which our Utrecht colleagues, who lead the formative evaluation, have designed as 'a virtual workshop' (Lam, Taconis, & Veen, 1997).
2. **Online Service to Teachers in Schools**The Telematics Centre within the University of Exeter School of Education has created a new form of inservice training to teachers directly in their schools using video conference telecommunications. The services are being provided in England and partners indicated that they could find the approach useful in the T3 multimedia needs analysis (Davis, 1997). The technology is used in a point-to-point link from the university to a school and in addition to the voice and video of participants, they share resources on video tape and disk, and put documents, slides and objects under the document camera. The video channel is also used to show live footage of demonstrations or work on the traditional board. Teachers can have an intense one-to-one tuition with a teacher educator in Exeter, or small groups of students can be linked to an expert who extends the curriculum and provides a model for new approaches to the curriculum and to teaching. For example, practising artists are one form of this *'expert in non residence'* service.
3. **A Modular Course for Advanced Students**Several of the T3 universities have masters level courses for practising teachers and a common approach is modular. We are currently redesigning a new set of three modules to take full benefit from the flexibility offered by telematics. The first course, *Teaching effectively using*

ICT,' will be piloted this winter. It will involve groups of between 6 and 16 teachers and trainers in a variety of locations, including the home site in The Telematics Centre in Exeter. The majority of the course will be online complemented with two face-to-face sessions: one at the start of the course on the 14/2/97 and a second one, five weeks later. Students will use the course text (Somekh & Davis, 1997) as compulsory reading material plus other material on paper and material on the WWW. Interactive forms on the Course Web Site within the T3Centrum will be used by the students to build their portfolios and their action research, which will deploying ICT within their teaching. Students will be encouraged to adopt peer tutoring among the group and so model a teaching strategy that has been found valuable within Superhighways for Education projects in the UK. Seminars will take the form of online discussions. Phone and E-mail will be widely deployed for individual contact. All the tutors will share a discussion forum of their own. Tutors will be encouraged to support variations in the course in order to adapt to the needs of the individual teachers and groups, particularly in relation to the discussion of examples of ICT applications and their contexts, including assessment. A second course *'Learning effectively using ICT'* is planned for summer 1998.

The Successes and the Stresses

This paper will now consider the international collaboration uncovering the successes and the stresses. The courses described above show ways in which strategies and resources can be transferred across institutional and national boundaries. Already we are being asked by others can they join in and do the same? The answer is of course yes, you can share too, but actually none of us are the same. Telematics applications are built upon the process of teacher education. None of us have simply applied a T3 like a coat of paint to our courses. To ensure that telecommunications are deployed effectively, the process must involve reflecting on the act of communication within a course, its resources and organisation and changing them to deploy ICT effectively for teaching and learning, including the modeling of good practice.

The majority of T3 courses encourage action research and reflective practice, thus enhancing the quality of teaching and learning. For example, courses for student teachers in Exeter are structured by the Exeter model of reflective practice. Another University cannot simply take Exeter's material and strategies, but it can learn from its approach, just as Exeter can learn from partners' experience and experiments.

The design of the Environmental Education course and the advanced courses described above have been significantly influenced by the trial of a course for student teachers of Technology which was created by our Finnish colleagues and taught over three countries in summer 1997. The Control Technology Course can be visited at http://edtech.oulu.fi/t3/courses/wp13/english/ Interestingly the course was not a universally enjoyable experience, especially noted by Exeter students who were unfamiliar with both telematics and control technology. McShea and Givens (submitted) discuss how this was related to both the technology and the approach. Students had difficulties with the interfaces, which although friendly on the WWW, their central learning task involved both the transfer and integration of files across formats, computer systems and countries, plus control of a model train using programming commands, occasionally with delayed and misleading feedback. Even an expert could have been confused when working at this level. Many of the Exeter student teachers were also telematic and control technology novices. Although they found the tasks uncomfortably challenging, on reflection they commented on how much they had learned and recognised the extraordinary challenges that learners can face and still learn!

In addition to these technological stresses, we find that the approaches and philosophy of teacher education varies with the institution and the country. Philosophies of education and approaches to research and development in teacher education with IT do vary widely, as described by Jerry Willis in his Keynote paper to the ITTE Memorial conference for Brent Robinson (Willis, 1997). He notes that the more traditional empirical approach is complemented today with more qualitative and contextualised views from critical theorists and constructivists. We suspect that our 'constructivist' approach in Exeter (Dunne & Harvard, 1993) is not shared by all of our partners and this may prove the most challenging issue of all.

Further Developments in 1998

I am hoping that our consortium of teacher educators across Europe will understand and continue to respect each others' approaches and philosophies during this last year. Our move to retain telematics within teacher training courses without direct support from the European Commission will undoubtedly cause stress. Should you wish to join and spread this community of practice, please visit the T3Centrum and see where your context and philosophical approach can fit to our mutual benefit.

Later this year we will abstract a core curriculum in telematics for teacher training for Europe and we plan to turn this into a policy document to help ourselves and our colleagues around the world to agree with their policy makers on the importance of strategic planning for teacher training and its wider value to the employers and the community.

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